DRAFT PROPOSED AMENDMENTS TO

APPLIANCE EFFICIENCY REGULATIONS

CALIFORNIA CODE OF REGULATIONS TITLE 20, SECTIONS 1601 THROUGH 1608

2011 APPLIANCE EFFICIENCY RULEMAKING,

PHASE II – BATTERY CHARGERS AND LIGHTING CONTROLS

CALIFORNIA
ENERGY COMMISSION

Edmund G. Brown Jr., Governor

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CALIFORNIAENERGY COMMISSION

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Proposed new language appears as underline (example) and proposed deletions appear as strikeout (~~example~~). Existing language appears as plain text. Three dots or "…" represents the substance of the regulations that exist between the proposed language and current language

Section 1601. Scope.

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(j) Fluorescent Lamp Ballasts and Self contained lighting controls

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(w) Battery charger systems, except those:

(1) used to charge highway vehicles;

(2) that are classified as devices for human use under the Federal Food, Drug, and Cosmetic Act and require U.S. Food and Drug Administration listing and approval as a medical device; and

(3) used to charge a battery or batteries in an illuminated exit sign, as defined in Section 1602(*l*).

(4) designed exclusively to be connected to distribution and transmission lines of peak voltage of 300 volts (V) or more.

(5) that are battery analyzers

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Section 1602. Definitions.

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(j) **Fluorescent Lamp Ballasts and Self Contained lighting controls.**

"Astronomical time-switch control" means a lighting control device that controls lighting based on the time of day or based on astronomical events such as sunset and sunrise, accounting for geographic location and day of the year.

"Automatic daylight control" means a lighting control device that automatically adjusts lighting levels in response to available daylighting. This control uses one or more photosensors to detect changes in daylight illumination and then changes the electric lighting level in response to the daylight changes.

"Automatic time switch control" means a lighting control device that controls lighting based on the time of day.

"Dimmer" means a lighting control device that varies the current through an electric light in order to control the level of illumination and the energy use.

"Lighting Control, Self Contained" means a unitary lighting control module where no additional components are required for a fully functional lighting control.

"Lighting Photo Control" means an automatic day lighting control device that automatically turns lights ON and OFF in response to the amount of daylight that is

available. A Photo Control may also have the capability to provide a signal proportional to the amount of daylight to a Lighting Control System for the purpose of continuously dimming the electric lights.

"Occupant Sensing Device" means a product that automatically controls light, allows for complete manual operation, and include the following devices:

Occupant Sensor, is used indoors, that automatically turns lights off when an area is vacated, and automatically turns the lights on when the area is occupied.

Motion Sensor, is used outdoors, that automatically turns lights off when an area is vacated, and automatically turns the lights on when the area is occupied.

Partial On, that automatically turns lights off when an area is vacated, capable of automatically turning on part of the lighting load and manually turning on part of the lighting load when an area is occupied.

Partial Off, that automatically turns off part of the lighting load when an area is vacated, and capable of automatically turning on the lighting load when an area is occupied.

Vacancy that automatically turns lights off when an area is vacated and requires lighting loads to manually be turned on.

(w) **Battery Charger Systems**

"~~Accumulated non-active~~24 hour charge and maintenance energy" means the sum of the energy, in watt-hours, consumed by the battery charger in battery-maintenance mode and ~~standby mode~~to charge the battery over time periods as defined in the applicable test method in Section 1604(w). This time period may exceed 24 hours.

~~"Active mode" means the condition in which the battery is receiving the main charge, equalizing cells, and performing other one-time or limited-time functions necessary for bringing the battery to the fully-charged state.~~

"Battery" or "battery pack" means an assembly of one or more rechargeable cells intended to provide electrical energy to a consumer product, and may be in one of the following forms: (a) detachable battery: a battery that is contained in a separate enclosure from the consumer product and is intended to be removed or disconnected from the consumer product for recharging; or (b) integral battery: a battery that is contained within the consumer product and is not removed from the consumer product for charging purposes.

"Battery analyzer" means a product used to analyze and report a battery's performance and overall condition. A battery analyzer is capable of being programmed and performing service functions to restore capability in deficient batteries. Battery analyzers are not intended or marketed to be used on a daily basis for the purpose of recharging batteries.

"Battery backup" or "uninterruptable power supply charger" means a small battery charger system designed to provide power to an end use product in the event of a power outage.

"Battery charger system (BCS)" means a battery charger coupled with its batteries or battery chargers coupled with their batteries, which together are referred to as *battery charger systems*. This term covers all rechargeable batteries or devices incorporating a rechargeable battery and the chargers used with them. Battery charger systems include, but are not limited to:

i. electronic devices with a battery that are normally charged from AC line voltage or DC input voltage through an internal or external power supply and a dedicated battery charger;

ii. the battery and battery charger components of devices that are designed to run on battery power during part or all of their operations;

iii. dedicated battery systems primarily designed for electrical or emergency backup;

iv. devices whose primary function is to charge batteries, along with the batteries they are designed to charge. These units include chargers for power tool batteries and chargers for automotive, AA, AAA, C, D, or 9 V rechargeable batteries, as well as chargers for batteries used in larger industrial motive equipment.

v. The charging circuitry of battery charger systems may or may not be located within the housing of the end-use device itself. In many cases, the battery may be charged with a dedicated external charger and power supply combination that is separate from the device that runs on power from the battery.

"Battery energy" means the energy, in watt-hours, delivered by the battery under the specified discharge conditions as determined using the applicable test method in Section 1604(w).

"Battery maintenance mode (maintenance mode)" means the mode of operation when the battery charger is connected to the main electricity supply and the battery is fully charged, but is still connected to the charger.

"Charge return factor" means the number of ampere-hour (Ah) returned to the battery during the charge cycle divided by the number of Ah delivered by the battery during discharge.

"Energy ratio" or "non-active energy ratio" means the ratio of the accumulated non-active energy divided by the battery energy.

"Inductive charger" means a small battery charger that transfers power to the charger through magnetic or electric induction.

"Large battery charger" means a battery charger (other than a battery charger for golf carts) with a rated output power of more than 2 kW.

"Multi-port charger" means a battery charger that is capable of simultaneously charging two or more batteries independently or charges multiple batteries at simultaneously with a single charge control circuitry. These chargers also may have multi-voltage capability, allowing two or more batteries of different voltages to charge simultaneously.

"Multi-voltage a la carte charger" means a separate battery charger that is individually packaged without batteries, and is able to charge a variety of batteries of different nominal voltages.

"No battery mode~~Standby mode (no-load mode)~~" means the mode of operation when the battery charger is connected to the main electricity supply and the battery is not connected to the charger.

"Power conversion efficiency" means the instantaneous DC output power of the charger divided by the simultaneous utility AC input power

"Small battery charger" means a battery charger with a rated output power of 2 kilowatts or less. This category includes golf cart battery chargers regardless of the output power.

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Section 1604. Test Methods for Specific Appliances.

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(j) Fluorescent Lamp Ballasts and Self Contained Lighting Controls.

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(w) Battery Charger Systems.

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(2) **California Test Method for Battery Chargers.** The test procedure for battery charger systems is *Energy Efficiency Battery Charger System Test Procedure* version 2.2 dated November 12, 2008 and published by ECOS and EPRI Solutions with the following modifications:

(A) Multi-port battery chargers shall be tested for 24-hour efficiency and maintenance mode with a battery in each port.

(B) Part 2 of the test procedure shall be conducted for 100, 80, and 40 percent discharge rates for only one charge profile, battery capacity, and battery voltage. The manufacturer shall test one battery and one charge profile using the following criteria:

i) the charge profile with the largest charge return factor;

ii) the smallest rated battery capacity; and

iii) the lowest voltage battery available at that rated capacity.

(C) Access to the Battery Protective Circuitry for Discharge Test: For products that include protective circuitry between the battery cells and the remainder of the device, and the manufacturer provides a description for accessing the connections at the output of the protective circuitry, these connections shall be used to discharge the battery and measure the discharge energy. The energy consumed by the protective circuitry during discharge shall not be measured or credited as battery energy.

(D) The battery's end of discharge voltage may be used in place of values in the test method Part 1, Section III.F, Table D.

(E) Single phase battery chargers shall be tested at 115V at 60 Hz and are not required to test at 230V at 50 Hz.

(F) For single port small battery chargers, the highest 24 hour charge and maintenance energy, maintenance mode, and no battery mode results of Part 1 of the test procedure shall be used for purposes of reporting and determining compliance with Table W-2.

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The following documents are incorporated by reference in Section 1604.

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ECOS CONSULTING

	Energy Efficiency Battery Charger System Test
	Procedure Version 2.2 dated ~~November 12, 2008~~
	January 26, 2009
Copies available from:	Ecos Consulting
	1199 Main Avenue #242
	Durango, CO 81301
	http://www.efficientproducts.org/
	Phone: (970) 259-6801
	FAX: (970) 259-8585

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Section 1605.1. State Regulations for Federally Regulated Appliances.

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(j) **Fluorescent Lamp Ballasts and Self Contained Lighting Controls ~~Replacement Fluorescent Lamp Ballasts~~.**

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Section 1605.2. Federal and State Regulations for Federally-Regulated Appliances.

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(j) Fluorescent Lamp Ballasts and Self Contained Lighting Controls.

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Section 1605.3. State Regulations for Non-Federally-Regulated Appliances.

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(j) Fluorescent Lamp Ballasts and Self Contained Lighting Controls.

(1) All lighting controls.

(A) A manufacturer shall provide step-by-step instructions for installation and start-up calibration of all lighting control devices.

(B) Indicator lights integral to lighting control devices shall consume no more than one watt of power per indicator light.

(2) Automatic Time Switch Controls.

(A) Residential and commercial automatic time switch controls labeled for use with lighting shall have program backup capabilities that prevent the loss of the device's schedule for at least 7 days, and the device's date and time for at least 72 hours if power is interrupted.

(B) Commercial automatic time switch controls labeled for use with lighting shall be capable of providing manual override to each connected load and shall resume normally scheduled operation after manual override is initiated within two hours for each connected load.

(C) Commercial automatic time switch controls labeled for use with lighting shall incorporate an automatic holiday shutoff feature that turns off all connected loads for at least 24 hours and then resumes normally scheduled operation.

(3) Astronomical Time Switch Control.

(A) Shall meet the requirements of an automatic time switch control.

(B) Shall have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year.

(C) Shall be capable of displaying date, current time, sunrise time, sunset time, and switching times for each step during programming.

(D) Shall have an automatic daylight savings time adjustment.

(E) Shall have the ability to independently offset the on and off for each channel by at least 99 minutes before or after sunrise or sunset.

(4) Automatic Day light Control.

(A) Shall be capable of reducing the power consumption in response to measured day lighting either directly or by sending and receiving signals.

(B) Shall comply with section 1605.3(j)(6)(ii) if the day lighting control is capable of directly dimming lamps.

(C) Shall automatically return to its most recent time delay settings within 60 minutes when put in calibration mode.

(D) Shall have a set point control that easily distinguishes settings to within 10 percent of full scale adjustment

(E) Shall have a light sensor that has a linear response within 5 percent accuracy over the range of illuminance measured by the light sensor.

(F) Shall have a light sensor that is physically separated from where the calibration adjustments are made, or is capable of being calibrated in a manner that the person initiating the calibration is remote from the sensor during calibration to avoid influencing calibration accuracy.

(G) Shall comply 1605.3(j)(5) if the device contains a photo control component.

(5) Lighting Photo Control

Lighting photo controls shall not have a mechanical device that permits disabling of the control

(6) Dimmer Control

(A) Shall be capable of reducing power consumption by a minimum of 65 percent when the dimmer is at its lowest level

(B) Dimmer controls that can directly control lamps shall provide electrical outputs to lamps for reduced flicker operation through the dimming range so that the light output has an amplitude modulation of less than 30 percent for frequencies less than 200 Hz without causing premature lamp failure.

(C) Wall box dimmers and associated switches designed for use in three way circuits shall be capable of turning lights off, and to the level set by the dimmer if the lights are off.

(D) Shall include an off position which produces a zero lumen output.

(E) Shall not consume more than 1 watt per lighting dimmer switch leg when in the off position.

(7) Occupant sensing devices

(A) All Occupant sensing devices shall:

i. be capable of automatically turning off all lights in the area no more than 30 minutes after the area has been vacated.

ii. Shall allow all lights to be manually turned off regardless of the status of occupancy.

iii. Shall have a visible status signal that indicates that the device is operating properly, or that it has failed or malfunctioned. The visible status signal may have an override switch that turns the signal off

iv. Devices which utilize ultrasonic radiation for detection of occupants shall submit a Radiation Safety Abbreviated Report to the Center for Devices and Radiological Health, Federal Food and Drug Administration per 21 CFR 1002.12 (1996) and to the California Energy Commission.

v. Devices which utilize ultrasonic radiation for detection of occupants shall emit no audible sound, and shall not emit ultrasound in excess of the decibel levels shown in table J-3 measured no more than five feet from the source, on axis.

TABLE J-3 Ultrasound Maximum Decibel Values

Mid-frequency of Sound Pressure Third-Octave Band (in kHz)	Maximum db Level within third-Octave Band (in dB reference 20 micropascals)
Less than 20	80
20 or more to less than 25	105
25 or more to less than 31.5	110
31.5 or more	115

vi. Devices which utilize microwave radiation for detection of occupants shall comply with 47 CFR Parts 2 and 15 (1996) and be marked with an approved Federal Communications Commission identifier. In addition, they must have permanently affixed installation instructions recommending that it be installed at least 12 inches from any area normally used by room occupants.

vii. Devices which utilize microwave radiation for detection of occupants shall not emit radiation in excess of one miliwatt per square centimeter measured at no more than five centimeters from the emission surface of the device.

viii. Devices which are certified as having manual-on functionality shall not be capable of conversion by the user between manual and automatic on/off functionality in accordance with Section 1605.3(j)7(iv and vi) shall not incorporate dip switches or other manual means of conversion between manual and automatic functionality.

(B) Occupant sensing devices incorporating dimming shall:

i. Be capable of automatically turning on the connected loads from the off state to no greater than 50 percent of power.

ii. Be capable of automatically turning connected loads off.

(C) Motion sensor shall be rated for outdoor use.

(D) Partial On shall be capable of automatically turning on part of the connected lighting load and manually turning on part of the lighting load when an area is occupied, either through dimming functionality, or shall incorporate the following functionality:

i. Have two poles each with automatic-off functionality

ii. Have one pole that is manual-on and shall not be capable of conversion by the user to automatic-on functionality

iii. Have one pole that is automatic-on and shall not be capable of conversion by the user to manual-on functionality

(E) Partial Off shall be capable of automatically turning off part of the lighting load when an area is vacated, and capable of automatically turning on the lighting load when an area is occupied either through dimming functionality, or shall incorporate the following functionality:

i. Have two poles

ii. Have one pole that is manual-on and manual off

iii. Have one pole that is automatic-on and automatic-off and shall not be capable of conversion by the user to manual-on only functionality.

(F) Vacancy sensors shall

i. not turn on lighting automatically and shall not be capable of conversion by the user to automatic on functionality. Vacancy sensors may have a grace period of no more than 30 seconds and no less than 15 seconds to turn on lighting automatically after the sensor has timed out

ii. Vacancy sensors shall not have an override switch that disables the sensor.

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(w) Battery Charger Systems.

(1) **Large Battery Chargers** manufactured on or after July 1, 2013 shall meet the applicable performance values in Table W-1.

Table W-1

Performance Parameter		Standard
Charge Return Factor (Crf)	100 percent, 80 percent Depth of discharge	$C_{rf} \leq 1.10$
	40 percent Depth of discharge	$C_{rf} \leq 1.15$
Power Conversion Efficiency		Greater than or equal to: 89 percent
Power Factor		Greater than or equal to: 0.90
Maintenance Power		Less than or equal to: 20 W
No Battery Power		Less than or equal to: 10 W

(2) **Small Battery Chargers** that are consumer products and are manufactured on or after July 1, 2012 shall meet the applicable performance values in Table W-2. Small battery chargers that are not consumer products and are manufactured on or after July 1, 2013 shall meet the applicable performance values in Table W-2.

EXCEPTION to Section 1605.3(w)(2): A small battery charger that is made available by a manufacturer directly to a consumer or to a service or repair facility, after and separate from the original sale of the product, that requires the battery charger as a service part or spare part, shall not be required to meet the standards in Tables W-2 until July 1, 2017

Table W-2
Standards for Small Battery Chargers

Performance Parameter	***Standard***
24 hour charge and maintenance energy (Wh) (E_b = average battery capacity of all batteries in ports and N = number of ports)	For E_b of 100 Wh or less $(12 + 1.6E_b) \times N$
	For E_b of between 100 and 1000 Wh $(22+1.5E_b) \times N$
	For E_b of 1000 Wh or greater $(122+1.4E_b)$
Maintenance Mode and No Battery Mode.	The sum of maintenance power and no battery power must be less than or equal to: $(1+0.0021xE_b) \times N$ Watts (N = number of ports)

(3) **Inductive chargers** manufactured on or after July 1, 2012 shall meet either the applicable performance standards in Table W-2 or shall use less than one watt in maintenance mode, less than one watt in no battery mode, and less than 24 watt-hours of 24 hour charge and maintenance energy.

(4) **Battery backup and uninterruptable power supplies** manufactured on or after July 1, 2013 shall consume no more than $0.8+0.0021 \times E_b$ watts where E_b is the battery capacity in watt-hours.

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Section 1606. Filing by Manufacturers; Listing of Appliances in Database.

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(a) Filing of Statements

(3)Testing and Performance Information

EXCEPTION 4 to Section 1606(a)(3)(D) : Before July 1, 2014 manufacturers of large battery charger systems and of small battery charger systems that are not consumer products may certify multiple battery chargers using the testing results of two or more representative battery charger models, provided that all models so certified are designed to charge batteries of the same chemistry and design. All models certified in this manner must meet the requirements of Section 1606(a)(3)(D), in that untested models must have performance characteristics equal to or better than what is certified. For this reason the models selected for testing by the manufacturer must be those that the manufacturer expects to have the lowest performance out of the set to be certified, and manufacturers must report the lowest values generated by the performed tests.

Manufacturers certifying their models using this alternate method shall, as part of the declaration required in Section 1606(a)(4), make a statement under penalty of perjury that all certified models meet all applicable standards and have performance characteristics equal to or better than the reported results.

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Table X Continued - Data Submittal Requirements

	Appliance	Required Information	Permissible Answers
J	Lighting Control	Includes step by step installation and calibration instructions	Yes/no
		Includes indicator lights which consume 1 watt or more	Yes/no
		Meets the requirements of an automatic time switch control	Yes/no
		Meets the requirements of an astronomical time switch control	Yes/no
		Meets the requirements of an motion sensor	Yes/no
		Meets the requirements of an automatic daylight control	Yes/no
		Is packaged with a photo-control	Yes/no
		Meets the lighting photo-control requirements	Yes/no
		Meets the dimmer control requirements	Yes/no
		Meets general occupancy sensor requirements	Yes/no
		Is rated for outdoor use	Yes/no
		Meets partial on requirements	Yes/no
		Meets partial off requirements	Yes/no
		Meets vacancy sensor requirements	Yes/no
		Uses ultrasonic occupancy detection	Yes/no
		Meets Requirements ultrasound requirements	Yes/no
		Uses electromagnetic radiation for occupancy detection	Yes/no
		Meets Electromagnetic irradiance at 5cm from emitter (mW/cm^2)	

* "Identifier" information as described in Section 1602(a).
1 = Voluntary for federally-regulated appliances
2 = Voluntary for state-regulated appliances

…

Table X Continued - Data Submittal Requirements

	Appliance	Required Information	Permissible Answers
w	Small Battery Charger	24 hour charge and maintenance energy	
		Battery Maintenance Mode Power	
		No Battery Mode Power	
		Inductive Charger	Yes/no
		Number of charger ports	
		Compatible battery chemistries	
		Battery backup or uninterruptable power supply	Yes/no
	Large Battery Charger	Charge return factor 100	
		Charge return factor 80	
		Charge return factor 40	
		Power conversion efficiency	
		Power Factor	
		Maintenance mode power	
		No battery mode power	
		Family certification	Yes/no
		Compatible battery chemistries	

* "Identifier" information as described in Section 1602(a).
1 = Voluntary for federally-regulated appliances
2 = Voluntary for state-regulated appliances

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(4) Declaration

(A) Each statement shall include a declaration, executed under penalty of perjury of the laws of California, that:

. . .

4. the appliance was tested under the applicable test method specified in Section 1604, and, for the following appliances, was tested as follows:

. . .

m. for battery charger systems for which certification is based on testing of representative battery charger models, the models tested as representative are those known or expected to have the poorest performance characteristics such that the data generated meets the requirements of Section 1606(a)(3)(E) for all associated models.

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5. all units of the appliance are marked as required by Section 1607, and, for the following appliances are marked as follows:

…

l. for battery charger systems, each battery charger shall be marked with a "BC" inside a circle. The marking shall be legible and permanently affixed to the product nameplate that houses the battery charging terminals. Products with a nameplate area of less than ½ square inch shall permanently affix the marking to the retail packaging and, if included, the cover page of the instructions.

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Section 1607. Marking of Appliances.

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(d) Energy Performance Information.

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(12) Battery Charger Systems

(A) Each battery charger shall be marked with a "BC" inside a circle. The marking shall be legible and permanently affixed to the product nameplate that houses the battery charging terminals. Products with a nameplate area of less than ½ square inch shall permanently affix the marking to the retail packaging and, if included, the cover page of the instructions.

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